

Lesson 1: Introduction and Overview

- Importance of Software Engineering
- Discipline of Software Engineering
- The Software Crisis
- Software Phases

Lesson 2: Life Cycle Models

- Introduction with Barry Bohem
- Requirements Engineering
- Design
- Maintenance
- Software Process Model Introduction
- Waterfall Process
- Spiral Process
- Evolutionary Prototyping Process
- Rational Unified Process
- Agile Process
- Choosing a Model
- Lifecycle Documents

Lesson 3: Integrated Development Environment

- Eclipse Introduction
- IDE Overview
- Plug-Ins
- Eclipse Demo: Create Java Project
- Eclipse Demo: Create a Class
- Eclipse Demo: Run Configuration
- Eclipse Demo: Debugging

Lesson 4: Version Control Systems

- Interview with John Britton
- Version Control System Introduction
- Two Main Types of VCS
- Introduction to Git
- Git Workflow
- Git Demo: Intro to Git
- Git Demo: Git + Eclipse
- Git Demo: Github
- Git Recap: Local Repositories

- Git Recap: Remote Repositories

Lesson 5: Requirements Engineering

- Interview with Jane Cleland-Huang
- General RE Definition
- Software Intensive Systems
- Functional and Nonfunctional Requirements
- User and System Requirements
- Modeling Requirements
- Analyzing Requirements
- Requirements Prioritization
- Requirements Engineering Process

Lesson 6: OO Software and UML

- Object Orientation Introduction
- UML Structural Diagrams: Class Diagrams
- Class Diagram: Creation Tips
- UML Structural Diagrams: Component Diagram
- UML Structural Diagram: Deployment Diagram
- UML Behavioral Diagram: Use Case
- Use Case Diagram: Creation Tips
- UML Behavioral Diagrams: Sequence
- UML Behavioral Diagrams: State Transition Diagram

Lesson 7: Software Architecture

- Interview with Nenad Medvidovic
- What is Software Architecture?
- Prescriptive vs. Descriptive Architecture
- Architectural Evolution
- Architectural Degradation
- Architectural Recovery
- Architectural Elements
- Components, Connectors, and Configuration
- Deployment Architectural Perspective

Lesson 8: A Tale of Analysis and Design

- Analyzing Requirements
- Refining Classes and Attributes
- Adding Attributes
- Identifying Operations

- Refining the Class Diagram

Lesson 9: Design Patterns

- Patterns Catalogue
- Pattern Format
- Factory Method Pattern
- Strategy Pattern
- Choosing a Pattern
- Negative Design Patterns

Lesson 10: Unified Software Process

- Use-Case Driven
- Inception Phase
- Elaboration Phase
- Construction Phase
- Transition Phase
- Phases and Iterations

Lesson 11: General Concepts

- Failure, Fault and Error
- Verification Approaches
- Pros and Cons of Approaches
- Testing Introduction
- Testing Granularity Levels
- Alpha and Beta Testing
- Black and White Box Testing Introduction

Lesson 12: Black-Box Testing

- Systematic Functional Testing Approach
- Test Data Selection
- Category Partition Method
- Produce and Evaluate Test Case Specifications
- Generate Test Cases from Test Case Specifications
- Model Based Testing
- Finite State Machines

Lesson 13: White-Box Testing

- Coverage Criteria Intro

- Statement Coverage
- Control Flow Graphs
- Test Criteria Subsumption
- MC/DC Coverage

Lesson 14: Agile Development Methods

- Cost of Change
- Agile Software Development
- Extreme Programming (XP)
- XP's Values and Principles
- Test First Development
- Refactoring
- Pair Programming
- Continuous Integration
- Testing Strategy
- High Level Scrum Process

Lesson 15: Software Refactoring

- Reasons to Refactor
- Refactoring Demo
- Refactoring Risks
- Cost of Refactoring
- When Not to Refactor